

Topographic Laser Ranging and Scanning: Principles and Processing

Compiled by editors Jie Shan and Charles K. Toth, this newly published book provides a comprehensive and in-depth treatment of Lidar as an accurate, direct method for 3D geo-data collection of urban and forested areas. A total of 29 authors, mostly European and North American academics, contribute to the nineteen chapters. Chapters 1 and 4 treat the fundamentals of 'Light Amplification by Stimulated Emission of Radiation', laser ranging and laser sensor calibration. As technologies rapidly evolve, these detailed descriptions of contemporary airborne Lidar systems and terrestrial laser scanners (Chapters 2 and 3 respectively) may soon lose currency. It may have sufficed to refer the reader to the regular product surveys published in professional magazines. Chapter 3 is alone in covering terrestrial laser scanners, the other eighteen chapters are devoted to airborne Lidar. Chapter 5 zooms in on time-of-flight Lidar: the sole laser-ranging principle used in airborne Lidar. Chapters 6, 8 and 9 cover georeferencing, strip adjustment and registration, and quality aspects. Lidar systems emit millions of pulses per minute. To each associated point are assigned a multitude of attributes, such as planimetric coordinates, height value, intensity, mirror angle and number of returns. Efficient storage and smart management of the myriad data is thus essential, the subject of Chapter 10. One of the main geo-datasets generated from Lidar are digital terrain models (DTM), including surface- and elevation models: these refer to bare ground and require removal of unwanted points, such as those reflected from trees, buildings and other constructions. Hence automatic filtering and manual editing of Lidar point-clouds are crucially important - issues covered by Chapter 11. Determination of forest factors is a major use made of small-footprint airborne Lidar, the importance of which is growing, trees being repositories of carbon. Chapter 12 addresses forest inventory; the six authors are all from Finland, a country of which 70% is covered by forest. (Semi)automatic creation of 3D-city models requires data fusion, the topic of Chapter 13. Urban land cover consists predominantly of brick and concrete, and Chapters 15 to 19 on 3D building extraction provide in-depth insight concerning relevant ongoing research into automation of building reconstruction. This timely book provides a wealth of information on the most successful geo-data acquisition technology matured over the past decade.



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